

A1
CONT'D

--52. The optical disk according to Claim 51, wherein the cartridge case defines a space therein, and a size of the space is 300 or more % of a thickness of the substrate.--

--53. The optical disk according to Claim 51, wherein the cartridge case has a recess and a protrusion formed on the inner surfaces thereof which face the disk, and the recess and protrusion adjust airflow in the cartridge case while the disk is rotating and are arranged to diverge away from the center of the disk at angle between 5 and 90 degrees.--

--54. The optical disk according to Claim 51, wherein the hub has a convex center portion with a side wall sloping at an angle between 130 and 160 degrees at half the height of the hub.--

--55. The optical disk according to Claim 51 wherein the substrate has a thickness of 0.7 or less mm.--

--56. The optical disk according to Claim 51, wherein the projected area X and the contact area Y satisfy the relationship of $Y/X \geq 0.02$.--

--57. The optical disk according to Claim 56, wherein the disk is rotated at a speed of 2,400 or more rpm for recordation and reproduction.--

--58. A disk substrate for an optical disk which is mounted on a magnetic mounting part of a driving apparatus for driving the optical disk comprising:

a disk plane tilting substantially with respect to a plane perpendicular to an axis of rotation of the substrate; and

a hub which is attractable by the magnetic part to press the optical disk in such manner that the disk plane becomes horizontal when the disk is mounted on the mounting part of the driving apparatus.--

--59. The disk substrate according to Claim 58 wherein the substrate has a thickness of less than 0.8 mm.--

--60. The disk substrate according to Claim 58, further comprising a cylindrical

A1
CONTID

receptacle formed in a center thereof for holding the hub, the receptacle having a hole formed through the bottom thereof coaxially with the axis of rotation.--

--61. The disk substrate according to Claim 60, wherein the disk plane tilts at an angle θ away from the bottom of the cylindrical receptacle, and the angle θ satisfies the relationship of $1 \text{ mrad} \leq \theta \leq 20 \text{ mrad}$.--

--62. The disk substrate according to Claim 61, wherein the hub is held movably in the cylindrical receptacle.--

--63. The disk substrate according to Claim 62, wherein the disk substrate has a thickness between 0.1 and 0.7 mm.--

--64. The disk substrate according to Claim 58, a relationship of $Y/X \geq 0.015$ is satisfied, where X and Y respectively denote the projected area of the substrate and the contact area between the hub and the substrate.--

--65. The disk substrate according to Claim 58, wherein the hub has an outer diameter that is 26 or more % of the outer diameter of the substrate.--

--66. An optical disk which has the disk substrate according to Claim 58.--

--67. A disk substrate for an optical disk, the substrate having an axis of rotation and a thickness of less than 0.8 mm, wherein a disk plane tilts at a tilt angle θ , which satisfies $1 \text{ mrad} \leq \theta \leq 20 \text{ mrad}$, with a plane perpendicular to the axis of rotation.--

--68. The disk substrate according to Claim 67, further comprising a hub that can be magnetically attracted.--

--69. The disk substrate according to Claim 67, wherein the tilt angle θ ranges between 10 and 20 mrad.--

--70. The disk substrate according to Claim 69, further comprising a cylindrical receptacle formed in the center thereof for holding the hub, the receptacle having a hole

formed through the bottom thereof coaxially with the axis of rotation.--

--71. The disk substrate according to Claim 70, wherein the hub is held movably in the cylindrical receptacle.--

--72. The disk substrate according to Claim 69, wherein the disk substrate has a thickness between 0.1 and 0.7 mm.--

--73. The disk substrate according to Claim 68, wherein a relationship of $Y/X \geq 0.015$ is satisfied, where X and Y respectively denote the projected area of the substrate and the contact area between the hub and the substrate.--

--74. The disk substrate according to Claim 68, wherein the hub has an outer diameter that is 26 or more % of the outer diameter of the substrate.--

--75. An optical disk including the disk substrate according to Claim 68.--

--76. A driving apparatus for driving a record disk having a tilt and a hub which is magnetically attracted to press the record disk, comprising:

a driving unit; and

a support for supporting a part of the record disk to adjust the tilt of the disk.--

--77. The driving apparatus according to Claim 76, wherein the record disk has an axis of rotation and a disk plane substantially tilting with respect to a plane perpendicular to the axis of rotation.--

--78. The driving apparatus according to Claim 76, wherein the record disk has an axis of rotation, a thickness of less than 0.8 mm and a disk plane tilting at a tilt angle θ with a plane perpendicular to the axis of rotation, the tilt angle θ satisfying the relationship of $1 \text{ mrad} \leq \theta \leq 20 \text{ mrad}$.--

--79. The driving apparatus according to Claim 76, wherein the record disk has an axis of rotation and a cylindrical receptacle for holding the hub, the receptacle having a hole formed through the bottom thereof coaxially with the axis of rotation.--

A1
CONT'D

--80. The driving apparatus according to Claim 77, wherein the driving unit has a rotating shaft for rotating the record disk, and the support is formed at the top of the shaft.--

--81. The driving apparatus according to Claim 79, wherein the driving unit has a rotating shaft for rotating the record disk, the rotating shaft has a cylindrical recess formed coaxially in the top thereof for holding the cylindrical receptacle, the rotating shaft also has a side wall defining the recess, and the support is formed at the top of the side wall.--

--82. The driving apparatus according to Claim 81, wherein the rotating shaft protrudes axially from the bottom of the cylindrical recess, and the shaft includes:

a first columnar protrusion having an outer diameter larger than that of the hole in the bottom of the record disk; and

a second columnar protrusion protruding coaxially from the first protrusion axially of the rotating shaft.--

--83. The driving apparatus according to Claim 79, wherein the disk plane tilts at an angle θ with a direction perpendicular to the axis of rotation away from the bottom of the cylindrical receptacle, and the angle θ satisfies a relationship of $1 \text{ mrad} \leq \theta \leq 10 \text{ mrad}$ --

--84. The driving apparatus according to Claim 81, wherein the top of the cylindrical wall defining the recess of the rotating shaft extends radially outward.--

--85. The driving apparatus according to Claim 82, wherein, when the record disk is mounted on the driving apparatus, the hole of the disk engages with the second protrusion to support the disk plane of the disk on top of the horizontal support, whereby the disk plane is kept at an angle of 10 or less mrad with a plane perpendicular to the axis of rotation of the disk.--

--86. The driving apparatus according to Claim 80 the rotating shaft includes a magnet fitted therein for attracting the hub.--

--87. The driving apparatus according to Claim 86, wherein the magnet is an electromagnet.--

--88. A driving apparatus for recording and reproducing information by radiating light onto the recording surface of a record disk including a hub that is magnetically attracted to press a part of the disk, comprising:

a light source for irradiating the record disk with light;

a tilt sensor for measuring a tilt angle of the recording surface of the record disk relative to the optical axis of the light incident on the disk;

a rotating shaft for rotating the record disk;

an electromagnet embedded in the rotating shaft; and

a controller for controlling the magnetic field intensity of the electromagnet based on the tilt angle detected by the tilt sensor, and for adjusting the force with which the hub presses the disk plane of the record disk.--

--89. The driving apparatus according to Claim 88, wherein the disk plane substantially tilts with respect to a plane perpendicular to the axis of rotation of the record disk.--

--90. The driving apparatus according to Claim 88, wherein the record disk has a thickness of less than 0.8 mm, the disk plane tilts at a tilt angle θ , which satisfies a relationship of $1 \text{ mrad} \leq \theta \leq 20 \text{ mrad}$, with a plane perpendicular to the axis of rotation of the disk.--

--91. The driving apparatus according to Claim 88, wherein the record disk includes a cylindrical receptacle for holding the hub, and the receptacle has a hole formed through the bottom thereof coaxially with the axis of rotation of the disk.--

--92. The driving apparatus according to Claim 89, wherein the controller controls the electromagnet to rotate the record disk so that the disk plane makes an angle of 10 or less